Dear Readers,

It gives me immense pleasure to share among you all that NRCL has been pioneer in developing new varieties of litchi/longan (Gandaki Sampada, Gandaki Lalima, Gandaki Yogita and Gandaki Longan-1) in recent past with high pulp content, smaller seed, bright red colour and delayed maturity. We have also identified a strain of Tricoderma which has been effective in recovery of wilting trees of Litchi as well as Shisham and Arjun.

Friends! The centre is marching ahead to touch the new heights in production and utilization of litchi in the country. In this endeavor, MOU has been established with BARC, Mumbai for joint research and setting up of litchi treatment facility and validate the technology of storage of pre-treated litchi fruits. The Centre is going to establish the Litchi treatment plant and Cool Chain system. We also expect "Model Pack House facility" at NRCL for fresh Fruits and Vegetables’ through funding from APEDA and Govt. of Bihar very soon. The centre has tailored its R & D activities for addressing the litchi related problems and suggests the sustainable approach for improving the productivity and quality to various stakeholders. A National Conference on Perspectives of Challenges and Options in Litchi Production and Utilization is proposed at ICAR-NRCL, Muzaffarpur during from 6-7th June, 2017 for deliberation on upcoming research challenges and addressing farmers problems to make the litchi cultivation a profitable venture.

(Vishal Nath)  
Director
A substantial area of the country is under wastelands in the form of permanent and seasonal waterlogged, marshy land condition. Some parts of Bihar remain waterlogged (>1m surface water logging) for 4-5 months and become unproductive during these months. To stabilize and enhance net income from such low lying waterlogged ecosystem, litchi based cropping in pond based production system (litchi + banana + seasonal crops (vegetables)/litchi + papaya + seasonal crops on pond dyke + fish inside pond) was conceptualized and implemented in representative deep low lying areas (1.5-2.5 m water depth). The waterlogged low land area was converted into pond of about 2.5-3 m depth. The dug out soil was used to form high land pond dyke of 10-12 m width during creation of pond. The pond dykes were used for growing of multiple and diversified crops throughout the year with litchi + banana and litchi + papaya combinations. The ponds were used for rainwater harvesting for irrigation purpose during lean period and for fish culture. Performance of different fruits and seasonal crops grown with litchi based cropping system on pond bunds sowed that banana cv. Grand Naine recorded average bunch weight of 18.74-20.79 kg/plant with average yield 41.0-51.98 t/ha. Papaya cv. Pune Selection-3 recorded fruit yield of 10-26.8 kg/plant with average yield of 18.2-27.2 t/ha. On the basis of overall economic analysis of different models, the highest average net return and B:C ratio (Rs 10.31m & 2.41) was obtained with banana + cowpea-cabbage cropping system followed by banana + cowpea-Faba bean/maize (Rs 7.99m & 2.06) and papaya + maize/cowpea-Faba bean/cabbage cropping sequence (Rs 7.73m & 2.33).

*Alternaria alternata* causes leaf, panicle, and fruit blights in litchi

Litchi (*Litchi chinensis* Sonn.) is less affected by diseases than many other fruit trees in India. However, this disease was first noticed in 2012 on nursery plants as leaf blight. Initial symptoms resembled with potassium deficiency and started from the leaf tips as a light to dark brown necrosis that advanced towards the margins, leading to complete necrosis of the affected leaves that dried up subsequently. On orchard trees, leaf blight similar to nursery plants were observed, and at the reproductive phase, blighting of panicles and fruits occurred that was first noticed during April and June, 2014. Panicles get dried-off due to necrosis, while necrosis of pedicel led to complete drying of rind of developing fruits. Single-spore cultures from the fungus isolated on PDA gave rise to grayish-black colonies and produced obclavate, obpyriform or ellipsoidal conidia in long chains. Conidia had 1 to 4 transverse and 0 to 3 longitudinal septa, and measured...
16-40 x 4-13 \( \text{mm} \) (average 29.8 x 7.6 \( \text{mm} \)). These morphological characteristics conform to those of *Alternaria alternata* (Fr.) Keissl. The ITS1-5.8S-ITS2 region was amplified with primers ITS1 and ITS4 and sequenced (GenBank accession Nos KR149264 - KR149266). A BLAST search of GenBank database revealed 100% homology with the sequences of various *A. alternata* isolates (e.g. KJ008700, KJ526174, KM076936). Spraying leaves of 5 healthy nursery plants, 4 bunches of panicles, and 10 developing fruits on orchard trees with a 106 spores/ml conidial suspension reproduced leaf, panicle, and fruit blight symptoms in 10-15 days. Control plants sprayed with sterile distilled water remained symptomless. Re-isolation of the pathogen with the same morphological characters was achieved from symptomatic tissue fulfilling Koch's postulates.

Incidence of leaf blights in nursery plants during February 2012-2016 was between 22.2 to 50.3% while severity (PDI) ranged between 32.2-83.3. Disease incidence of panicle blight in farmers' field during 2015-2016 was 2.5-37.5% in cv. 'Shahi' while in cv. 'China' it was 17.0-58.0% in various orchards. Incidence of fruit blight in cv. 'China' ranged between 3.6-66.7%.

For management of this disease orchard sanitation should be followed by removing and destroying infected leaves wherever possible. For leaf blight, fungicidal spray of copper oxychloride (0.25%) or carbendazim (0.1%) can be done if disease severity increases. Prophylactic spray of difenoconazole (0.05%) or carbenazim (0.1%) or thiophanate methyl (0.1%) or azoxystrin (0.023%) may be done for panicle and fruit blight, one spray just after flowering and before fruit set, and another spray 20 days before harvest of fruits.

**Success Stories .................................................................

एनआरसीएल ड्राइकोर्डमा : एक उत्कृष्ट कक्षकाशी एवं जैववर्तक के सफलता की कहानी

‘एनआरसीएल ड्राइकोर्डमा’, ड्राइकोर्डमा निरिक्षण (ड्राइकोर्डमा अन्यरूप स्त्रोत ‘एनआरसीएल टी.09) आयोग एक जैवक फूल्टूँड़फूल/ कक्षकाशी उत्पाद है जिसे भा.कु.अनु.प. – राज्य की लोकी अनुसंधान केंद्र, गुरुग्राम ने विकसित किया है। यह स्त्रोत उच्च मूल लक्षणों (पीएच. ) और तापमान के प्रति सही है। यह सिडी से उत्पन्न होने वाले रोगों की विशेष रूप से पौधों और पुष्प के लिए एक महत्वपूर्ण जैवि नियंत्रक के रूप में कार्य करता है। इसके साथ ही, यह जैव.वर्तक के रूप में भी काम करता है जिससे उत्कृष्ट पौध पृष्ठीय होती है। केंद्रीय परीक्षण में, यह लोकी, शोषण, अर्जून और पपीता के प्लानी रोग को नियंत्रित करने में रामबाण साबित बुझ चुका है। यह सबसे खुशी की कहानी, फलों, सब्जियों और फूलों में इस्तेमाल किया जा सकता है।

एनआरसीएल प्रायोगिक प्रक्षेप में ड्राइकोर्डमा के प्रयोग से कई लोकी के पौधे, जिसमें पत्ते और फूल सुखे और तांगने लगे, फिर से हरे भरे हो गए और उनमें कफी अच्छा मिसंग और फल भी लग गए। इसी प्रकार प्रश्नों में कोई शोषण, अर्जून और पपीता के कई सूखे तेज़ जो स्लानी रोग से
Events and Meeting

1. ICAR Summer School on "Canopy Architecture Management in Fruit Trees for Conservation and Utilization of Natural Resources in Changing Climatic Conditions" was organized during 11-31 July, 2016. The course content broadly covered plant canopy management, status of research, issues and principles; canopy architecture design and planting geometry; how to improved orchard environment, HDP and climate resilient horticulture; adoption and mitigation; canopy management practices being followed in different fruit crops; multi storied cropping system, role of rootstocks in plant architecture management and importance of training systems, plant growth regulations and architecture management for better pest & disease management.

2. The ICAR Short Course on "Bioassay, Production Protocol and Quality Control for Trichoderma based Biopesticides" was organized during 05-14 September, 2016. The purpose of the course was to emphasize role of Trichoderma in crop health management and to provide hands on training on mass production and quality control of Trichoderma. Active researchers not below the rank of Assistant Professor or equivalent from SAUs/ICAR/SMS of KVKs, having minimum two years of experience in the disciplines of Agriculture /
Plant Pathology, Microbiology, and Life Sciences were eligible to apply. Twenty-two participants from nine different states (Bihar, Uttar Pradesh, Rajasthan, Maharashtra, Madhya Pradesh, Kerala, Arunachal Pradesh, Meghalaya, and Sikkim) attended and earned certificates. Besides NRCL faculty members, 5 guest speakers also delivered lectures on various topics during the course.
Participants had hands on training on the techniques viz., Isolation of *Trichoderma* spp. from soil; Preparation of temporary slides of *Trichoderma viride, T. harzianum*, *Fusarium solani* and *Alternaria alternata*; Observing conidiophores, phialides and conidia of *Trichoderma* spp., photomicrograph and micrometry; Estimation of conidial count (cells per mL) in sample suspension; Bioassay for antagonistic potential of *Trichoderma* (*T. viride / T. harzianum against A. alternata and F. solani*; Screening of isolates of *Trichoderma* for production of non-volatile and volatile compounds; Mass multiplication of *Trichoderma* through solid and liquid state; Bioformulation of *Trichoderma* using sorghum grain and talc based carriers including packaging; Studies on storability and shelf life of *Trichoderma* formulation; Viable count and quality assay of *Trichoderma* formulation; Method of enrichment of FYM with *Trichoderma*; and Sensitivity test of *Trichoderma* to pesticides during the course. The feedback collected in a detailed proforma from individual participants was analyzed. Most of them rated the course as 'excellent'. The participants were well satisfied and confirmed that they learnt new subject and techniques during the course.

3. The centre conducted Model Training Course (MTC) on "Good Agricultural Practices in Litchi" sponsored by Directorate of Extension, Ministry of Agriculture and Farmers Welfare, GOI at ICAR-NRC on Litchi, Muzaffarpur during 21-28th November, 2016. इस 5 दिवसीय प्रशिक्षण कार्यक्रम में कुल 29 प्रशिक्षणाध्यापकों ने भाग लिया जिसमें सहडोल, (मध्य प्रदेश), समस्तीपुर, युजनपुर, बैराजसिंह और फ्रेमाला विश्वविद्यालय (विद्यार्थी) के कृषि विभाग से जुडे हुए कर्मचारी एवं लामुख शामिल थे। पूरे प्रशिक्षण के दौरान कुल 23 लेक्चर और 92 प्रक्तिकल किए जिसमें नए बाग लगाने से लेकर नए एवं पुराने बागों का प्रबंधन, सिवाई

4. Field Day celebrated at Kankatti, East Champaran under *Mera Gaon Mera Gaurav* programme: 
Dr. Vinod Kumar and his team members including Dr. Sanjay Kumar Singh, Dr. Alok Kumar Gupta and Shri Prabhat Kumar, organized a Field Day (प्रशिक्षण दिवस) on 26 September, 2016 at Kankatti (East Champaran), an adopted village under *Mera Gaon Mera Gaurav Programme* on the topic "सम-सामाजिक, कृषि समस्याओं एवं उनका समाधान (Current problems of crops in fields and their management)". Different scientists in the team interacted on the specific issues like a) मिट्टी जांच, खाद एवं उर्फ़रक की मात्रा एवं प्रबंधन (b) मुख्य खाद एवं सहायक और निकाल में (c) खाद एवं सहायक में रूपांतरण और उनका समाधान (d) जैव उर्फ़रक-महत्त्व एवं प्रबंधन विधि (e) प्रभावक फसलों के कीट और रोगों का प्रबंधन. During the programme, problems of current crops in field were discussed and solutions for them were suggested to farmers. Also, planning for the ensuing field crops and recommended package of practices for ginger, potato, tomato and other vegetables, mustard, *rabi* pulses and fruit crops, like litchi and mango were discussed with farmers.
5. The 15th Institute Research Council (IRC) meeting of NRCL was held on 11th and 12th November, 2016 under the Chairmanship of Dr. Vishal Nath, wherein, individual scientist of each theme areas made a brief presentation of his/her contributions with respect to the research and extension activities for the year 2017-18 across disciplines.

6. लीची पर आयोजित अंतरराष्ट्रीय सेमिनार के पश्चात भारतवर्ष में चल रहे लीची शोध एवं विकास के कार्यों का विदेशी मेहमानों ने प्रमाण किया। राष्ट्रीय लीची अनुसंधान केंद्र के प्रयोगिक प्रक्रिया एवं प्रयोगशाला प्रमाण के समय दक्षिण अफ़्रीका की वैज्ञानिकों द्वारा रेखांकन के संस्थान पर चल रहे शोध कार्यों की "अद्वैत एवं अलंकार लाभदायक" कहा। वैज्ञानिकों ने कैनोपी मैनेजमेंट (क्षेत्रिक प्रबंध), जयपुराज, सचन बांग्लादेश तथा जल प्रबंध के प्रयोग को देखकर अलंकार प्रसन्न निकले। एडवर्ड गार्नर्ड एवं निक जोसन ने पोस्ट हार्वेस्ट सुविधाओं की जमकर तारीख की। दक्षिण अफ़्रीका के वैज्ञानिकों ने मुजफ्फरपुर एवं समस्तीपुर के कुछ किसानों के बगीचे का भी प्रमाण किया।

7. ICAR-National Research Centre on Litchi celebrated 2nd October (Gandhi Jayanti) - the day by contributing
voluntary cleanliness drive. "Swachhta Pakhwada" was organized from 16 to 31 October 2016 spreading the message of cleanliness, hygiene "Swachha Bharat Swasth Bharat". During this "Pakhwada" cleanliness drive (21 and 31 October 2016) was conducted in Research Farm, Fish pond bank, Office premise, sports ground, office chamber, laboratory. Fish pond banks and farm pathways which were covered with unwanted weeds, bushes and garbage's was removed & disposed off in separate decomposable and non decomposable pits. Volleyball ground and nearby areas were cleaned with spade, grass cutter, broom etc. Also, Office premise, vehicle parking area, approach road were cleaned and dusted with bleaching powder where needed. All staff cleaned their office sitting place, book/file Almirah etc, individually.
8. The 11th Institute Management Committee (IMC) meeting was conducted at the centre on 28th November, 2016 in the chairmanship of Dr. Vishal Nath, Director in the Committee Room of ICAR-NRC on Litchi, Muzaffarpur, other members were Dr. A. K. Mishra, Head, CISH, Lucknow, Dr. V. K. Gupta, Pr. Scientist, ICAR-RCER Research Centre for Makhana, Darbhanga and Dr. Ashish Gupta, In-charge, Head, ICAR-IARI, Regional Station, Pusa, (Bihar). Sh. Mukesh Kumar Sharma, Sh. Ranjan Kumar Sahu were the farmers representative. The members expressed their happiness on research activities, development of facilities and infrastructures in the farm as well as laboratory and office to undertake the advanced research in the field of litchi. Members were also eager to know about the methods used by the Center to disseminate information related to research and development to the farmers and other stakeholders. Some concern was also raised about the litchi borer. The members expressed their satisfaction over the pace of research.
Awards and Honours
- Dr. Vishal Nath, Director had been elected as Chairperson of Working Group on litchi, longan and other sapindaceae fruits by ISHS, Belgium.
- Dr. Vishal Nath, Director has also been nominated as President, CHAI, Pusa Unit, Bihar.
- Dr. Vishal Nath, Director has been nominated as member of the Editorial Board for the *Indian Horticulture*, a bimonthly magazine published by ICAR-DKMA, New Delhi.
- The paper entitled 'Flushing Pattern and Physiology of Flowering in Litchi' presented by Sanjay Kumar Singh, Vishal Nath, Amrendra Kumar, S D Pandey and Ankit Kumar Pandey got best poster award during 7th Indian Horticulture Congress (15th-18th November, 2016) at ICAR-IARI, New Delhi.

Human Resources Development
- Dr. Alok Kumar Gupta, Scientist took part in 1st International Agro-biodiversity Congress (IAC) held at New Delhi during 6th-9th November, 2016.
- Dr. Vishal Nath, Dr. S.D Pandey, Dr. Amrendra Kumar and Dr. Sanjay Kumar Singh, presented research papers in 7th Indian Horticulture Congress held at Dr. B. P. Pal Auditorium, IARI Campus, New Delhi during 15th-18th November, 2016.
- Dr. Sanjay Kumar Singh, presented paper entitled 'Physiology of Flowering in Litchi verses Mango: a Concept' In: International Seminar on "Recent Trends and Experimental Approaches in Science, Technology and Nature" (23rd-24th December, 2016) at ICAR-Indian Institute of Sugarcane Research, Lucknow, India.
- Dr. Vinod Kumar, Senior Scientist, participated in the National Conference on "Management of microbial resources for food security under climate smart agriculture" held at Dr. Rajendra Prasad Central Agricultural University, Pusa, Bihar during December, 22-24, 2016 and delivers an invited lecture on "Microbial resources for improved productivity of fruit crops with special reference to mycorrhiza".

Visitors
- Dr. H. P. Singh, President CHAI and Former DDG (Hort.) visited the centre on 11th July 2016.
- Shri Dharmendra Singh, DM, Muzaffarpur, Smt. Baby Kumari, MLA, Bochaha, Muzaffarpur and Shri Manoj Kumar Singh, LFS, Conservator of Forest, Tirhut Range, Muzaffarpur visited the centre on 22nd July, 2016.
- Dr. Birlal Singh Former Director, CPRI, Shimla visited the centre on 2nd September 2016.
- Shri Sumedha Nagrore, Director NSSO (FOD), Nagpur visited the centre on 28th September, 2016.

Future Events
- Research Advisory Committee meeting of NRCL is schedule on 11th May, 2017 under the Chairmanship of Dr. S. D. Shikhamany.
- National Conference on Perspective of Challenges and Options in Litchi Production and Utilization is schedule on 6-7th June 2017.
Three hundred years old plant of litchi has been located in West Champaran (Bethia) district of Bihar in the garden of erstwhile king of Shikarpur. The plant is huge and gigantic with a canopy cover of more than 400 m². The plant is located on the bank of a tributary flowing from Nepal, the bordering country. It is believed as stated by Mr. Rahim, a old nursery man in the district, that the king of Shikarpur had family relations with king of Nepal who has gifted the best plants to him as a token of regard and strengthening the relationship. The single plant produces more than 5 quintals of fruits and being sold in 60-70 thousands rupees every year.
Published by
Prof. (Dr.) Vishal Nath, Director

Compiled and Edited by
Dr. Sanjay Kumar Singh
Dr. R. K. Patel
Dr. Alemwati Pongener

Contact us
Director
ICAR-National Research Centre on Litchi
Mushahari Farm, Mushahari,
Muzaffarpur 842002, Bihar (India)

Ph: 0621-2289475; Fax: 0621-2281162
Email: nrclitchi@yahoo.co.in
Website: www.nrclitchi.org
Facebook: https://www.facebook.com/nrconlitchi